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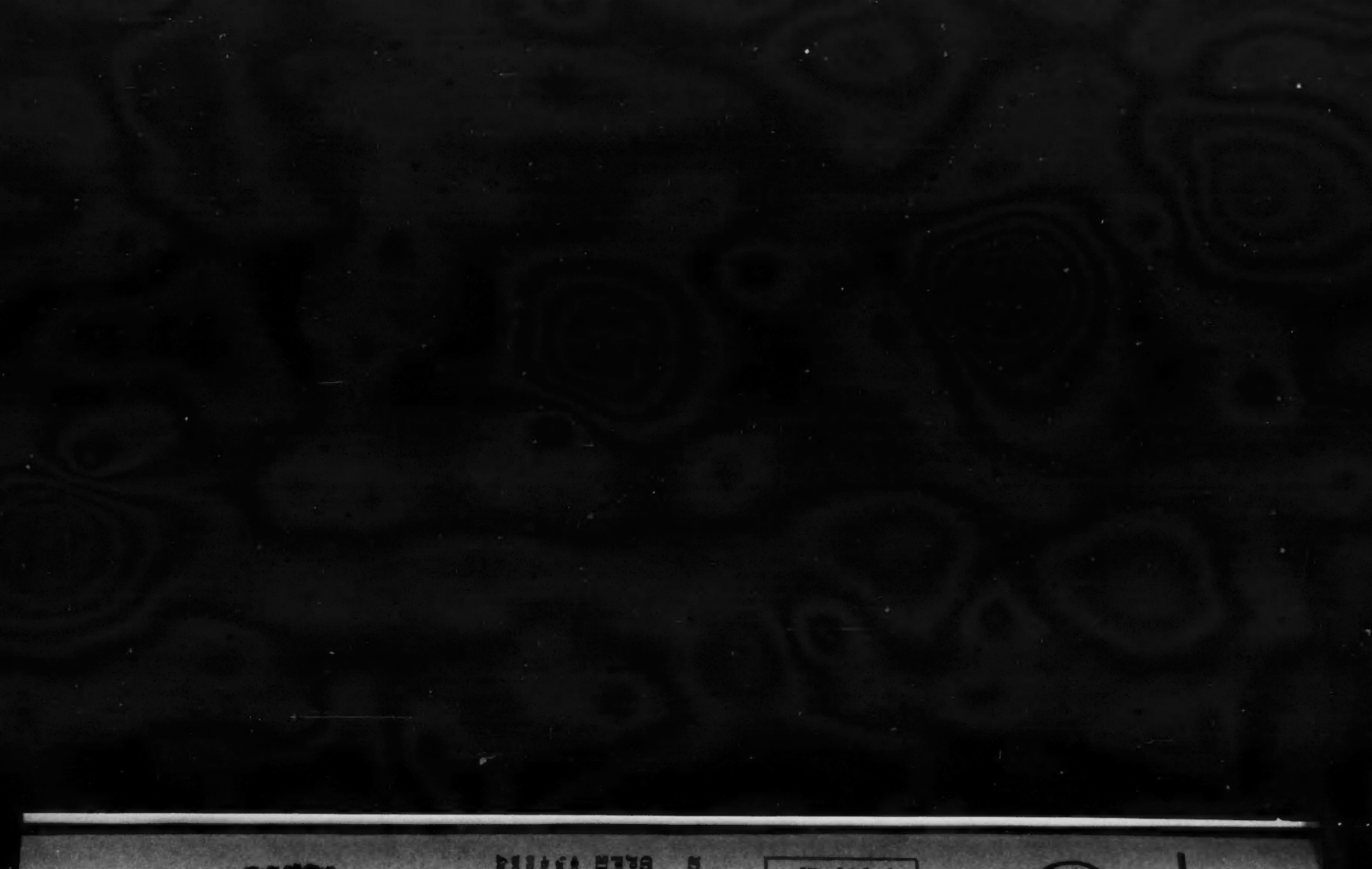

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Diphtheria Among Schick-Negative Persons in Halifax, Nova Scotia

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BETWEEN November 1943 and February 1944 the Laboratory of Hygiene, Department of Pensions and National Health*, undertook a series of studies on diphtheria in co-operation with the Department of Public Health of Nova Scotia and the Department of Public Health and Welfare of Halifax. Bacteriological and serological studies on diphtheria cases in Halifax and a carrier survey of its school children have been reported by Gibbard, Bynoe and Gibbons (1), and Bynoe and Helmer (2). The present report deals with a study of the histories of 1,349 cases admitted to the Infectious Diseases Hospital, Halifax, as diphtheria or suspected diphtheria, between June 1, 1941 and January 1, 1944.

Only those cases in which the clinical diagnosis of diphtheria was corroborated by bacteriological demonstration of the presence of *Corynebacterium diphtheriae* in the throat or nosé were tabulated. This policy was followed because it was desired in particular to study the incidence of incontestable cases of diphtheria among persons who had been primarily Schick-negative or who had received three doses of fluid toxoid. The group finally considered is composed of 1,028 clinical cases of diphtheria from which *C. diphtheriae* was isolated from the throat and/or nose.

It should be noted that the figures presented here cannot be used to calculate rates per unit of population. They include cases from outside municipalities who were hospitalized in Halifax but exclude those treated at home and all those in which a clinical diagnosis was not accompanied by bacteriological record.

**Now the Department of National Health and Welfare.*

Age and Sex Distribution of Cases.

Morton (3), Wheeler and Morton (4), and Campbell (5) have commented upon the unusual age and sex distribution of diphtheria in Halifax. McLeod (6) in his extensive review noted a shift of the main incidence of diphtheria from the preschool to the school age-group in the last decade.

The age and sex distribution of the 1,028 cases is shown in Table I. Forty-five per cent of the cases occurred in persons 15 years of age and over, and 28 per cent were in persons 20 years and over. If the cases from the Armed Forces were added, the proportion in the older age-group would be still higher.

TABLE I

AGE AND SEX DISTRIBUTION OF 1,028 CASES OF DIPHTHERIA (463 MALES; 565 FEMALES) IN HALIFAX, 1941-1943.

Age Group	Percentage Distribution of All Cases	Ratio of Male to Female Cases
0–4	15.2	0.7 : 1
5–9	23.7	1 : 1
10–14	15.9	1 : 1
15 +	45.1	1 : 1.8
N.B.—Age Group 20+	28.3% of cases.	Male : female ratio 1 : 2.2.

It has been suggested that an abnormal age distribution of the Halifax population may be a factor accounting for the high proportion of cases in adults. In Table II is shown the population in Halifax, Hamilton, and London (Ontario). According to the 1941 census there were relatively more children in the civil population of Halifax than in the Ontario cities. If the Armed Forces population be added, the balance between children and adults (15 years and over) becomes more like that in Hamilton and London. The figures for the Armed Forces population can only be approximate, but nevertheless it is obvious that the age distribution of the population in Halifax does not account for the high incidence in the older age-group.

TABLE II

AGE DISTRIBUTION OF POPULATION OF HALIFAX (WITH AND WITHOUT ARMED FORCES), HAMILTON, AND LONDON (ONTARIO)

	Age Groups 0–4		5–9		10–14		15+	
	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
Halifax* (Civilian) .	5778	8.2	5763	8.2	5592	7.9	53355	75.7
Halifax (Civil and Military).....	5778	6.5	5763	6.5	5592	6.3	71688	80.7
Hamilton*.....	11174	6.7	11456	6.9	13322	8.0	130385	78.4
London, Ont.*.....	5302	6.8	5036	6.4	5493	7.0	62433	79.8

*Taken from 1941 census figures.

The immunization program carried out in Halifax would seem to offer an explanation of the relatively low incidence in the younger age groups. At the onset of the epidemic the proportion of immunized persons in all age groups was

low and at this time the percentage of cases in the younger age groups was highest (Wheeler and Morton, 4). During the early stage of the epidemic a high proportion of school children was immunized and when an increased public health nursing personnel made more home visits possible, the preschool group was more successfully contacted and immunized. A survey in the spring of 1943 showed approximately 96 per cent of school children immunized and a repeat survey in May 1944 indicated that 96.7 per cent of school children and approximately 84 per cent of preschool children had been immunized. On the other hand, the endeavour to immunize the adult population had met with slower and only mediocre response. Campbell (5) reported that a survey of adults in Halifax in 1941 showed 80 per cent Schick-positive.

In the age-group 15 years and over there were 1.8 times as many females as males, and in the 20-years-plus group the ratio was 2.2 females to one male. Since figures for the sex distribution of the wartime population are not available, comment on this disproportion is not warranted. It is believed, however, that if the cases among the Armed Forces were added the difference would likely be close to the usual male to female ratio for adult groups.

Mortality.

Among the 1,028 cases there were 44 deaths. This figure cannot be used as a basis for calculating a case fatality rate because the rule of including only bacteriologically proven cases was waived in recording the number of deaths. Some of those who died were admitted to hospital only a few hours before death, and while bacteriological findings were not recorded there would appear to be little or no reason to query the clinical diagnosis. One can state, however, that the crude case fatality rate was not greater than 4.3 per cent. In comparing this relatively low case fatality rate with that of other reports of *gravis* and *intermedius* epidemics, the high proportion in adults must be taken into consideration. The distribution of deaths by age-groups is shown in Table III. While 45 per cent of the cases were 15 years of age and over, only 13.6 per cent of the deaths occurred in this age-group; 38.6 per cent of the deaths were under 5 years of age and 68.1 per cent were under 10 years. The school age-group 5-14 years contributed 47.7 per cent of the deaths.

TABLE III

AGE DISTRIBUTION OF 44 DEATHS FROM DIPHTHERIA IN HALIFAX, 1941-1943

Age Group	Per cent of Deaths	
0–4	38.6	
5–9	29.5	68.1
10–14	18.2	
15+	13.6	

Diphtheria in Primary Schnik-Negative and "Toxoided" Persons.

In recent years evidence has accumulated that the more virulent *gravis* and *intermedius* strains of *C. diphtheriae* may be able to cause clinical infection in

Schick-negative persons. Robinson and Marshall (7) report 13 cases with 2 deaths among Schick-negative persons. MacDonald (8) gives relative attack rates of 1 :500 to 1 :70 for immunized and non-immunized. Anderson (9) reports 15 cases with no deaths among 11,812 Schick-negative children. McLeod (6) quotes Prochazka as mentioning a number of cases in which diphtheria had occurred in Schick-negative individuals with a considerable amount of antitoxin in their serum. Grant lists 6 nurses who contracted diphtheria from 1 to 7 months after a Schick-negative test.

The "Schick-negative" group discussed in this report is composed of those who had shown a primary negative Schick test or a negative Schick test following immunization, or had received a course of at least three doses of fluid toxoid without a post-toxoid Schick test. The inclusion of the latter group would appear to be justifiable since Morton (3) reported that 98.8 per cent of those who completed a full course of toxoid at the Dalhousie Immunization Centre in Halifax were subsequently Schick-negative.

There were 250 cases (24 per cent) among those Schick-negative, distributed as shown in Table IV. Among the "toxoided", seven cases occurred within less than three months after the last dose, a period within which, according to some reports, they might not be expected to develop the fullest degree of protection from their inoculations. Twenty-seven cases had been "toxoided" more than three years previous to contracting diphtheria, and one case had a record of a primary negative Schick test more than three years previously. If we exclude these cases we still find that 21.6 per cent of all cases of diphtheria in Halifax either had shown a primary negative Schick test or had had a full course of three doses of fluid toxoid within three years of the onset of the disease.

TABLE IV

DIPHTHERIA CASES AMONG SCHICK-NEGATIVE AND "TOXOIDED" PERSONS IN HALIFAX, 1941-1943

Immunity Status of Cases	No. of Cases
Primary Schick-negative	36
Complete course of toxoid followed by a negative Schick test	123
Complete course of toxoid but no subsequent Schick test	91
Total	250

There were two deaths among this group—one, a boy aged 1½ years who had completed three doses of toxoid six months before his death but on whom no post-toxoid Schick test had been done; and a girl aged 10 years who had shown a primary negative Schick test two years and five months previously. She had not received toxoid. In addition three cases, aged 4, 8 and 11 years, were stated on the hospital chart to have had some type of inoculation during the previous year but there were no details of the type or number of inoculations and no record of them could be traced.

From the hospital charts cases were graded as mild, moderate, severe, and very severe (the latter group being composed of bull-neck cases, hypertoxic and/or haemorrhagic non-bull-neck cases, and a few obstructive laryngeal cases). In

Table V the severity of the 236 cases of the Schick-negative group is compared with a random sample of 316 from the remainder of the cases.

TABLE V

COMPARISON OF SEVERITY OF DIPHTHERIA, HALIFAX, 1941-43

Severity	Percentage Distribution in	
	236 Schick-Negative Cases	316 of Remainder of Cases
Mild and moderate	66.6	49.1
Severe	27.1	25.3
Very severe	6.3	25.6

Analysis of the time elapsing after "toxoiding" and/or a negative Schick test shows that severe and very severe cases comprised 28.6 per cent of the cases occurring within one year, 33.7 per cent up to 2 years, 38.6 per cent up to 3 years, and 40.7 per cent over 3 years (cumulative percentages).

Before commenting on the incidence of diphtheria in the Schick-negative group it might be well to review some points in regard to the Schick test, blood antitoxin levels and diphtheria immunity.

The Schick test is not a quantitative test in the full sense. When the test is negative, it indicates that the person tested possesses a certain minimum level of antitoxin but it does not indicate the excess above this minimum. Following a Schick test there may be an initial rise in antitoxin level due to the stimulus of the test material, but sooner or later, unless the "immunity" is reinforced by subclinical infection or by artificial stimulation, the antitoxin level begins to fall, and there may be marked variations in the individual rate of loss (Fraser and Halpern, 10). A person whose antitoxin level at the time of test was at a bare minimum to give a negative Schick reaction might thus soon become Schick-positive while one whose antitoxin level was high might remain Schick-negative for a prolonged period.

Gibbard, Bynoe and Gibbons (1) obtained blood from 33 cases of diphtheria before the administration of any antitoxin. Eleven samples contained more than 1:250 unit of antitoxin, the level commonly considered to give a negative Schick test. Of these, one containing between 1:50 and 1:100 unit was taken within 24 hours of onset of symptoms, six within 48 hours, two within 72 hours, and two within 96 hours. It might be assumed that these persons had had less than 1:250 unit at the onset of the infection and that their blood level of antitoxin had risen by the time the sample was taken. On the other hand, there were eleven persons whose blood was drawn within 48 hours and five within 96 hours of onset whose blood contained less than 1:500 unit of antitoxin and of these sixteen persons six had had, at some time previous, a primary stimulus of one or more doses of toxoid. It would thus seem possible, if not probable, that at least some of the seven cases which showed more than 1:250 unit of antitoxin when sampled within 48 hours of onset had had a sufficient level of antitoxin at the time of onset to be Schick-negative.

That the correlation between Schick-negative reaction, antitoxin level, and

true immunity against naturally acquired infection may not always be as simple as is sometimes assumed is illustrated by a further case described by Gibbard, Bynoe and Gibbons (1). A nurse at the Infectious Diseases Hospital developed a severe sore throat with cervical adenitis and a pseudomembrane on the left tonsil. The membrane was readily wiped off, and left an inflamed but not bleeding surface. She was not considered clinically to be a case of diphtheria. She had received three doses of toxoid eleven years previously. A routine throat swab showed a moderately heavy growth of *C. diphtheriae intermedius*, and she continued to harbour this organism for three days. The culture was fully virulent when tested on guinea pigs. Blood taken seventy-two hours after onset of sore throat showed less than 1 :500 unit of antitoxin, and a repeat blood, taken a month later, still showed less than 1 :500 unit. Her failure to show a rise in antitoxin titre after convalescence may be taken as an argument that she did not suffer from clinical diphtheria though a virulent strain of *C. diphtheriae intermedius* was repeatedly isolated from her throat. McLeod (6) quotes Parish who observed a diphtheria carrier whose serum was completely devoid of antitoxin. McGuire and Hitchens (13) reported three diphtheria carriers who were Schick-positive but showed no sign of disease during four weeks' observation.

It has been shown repeatedly that three doses of fluid toxoid will render from 95 to 99 per cent of persons Schick-negative. Morton (3) reported that 98.8 per cent of those who completed the course of immunization at Dalhousie Clinic, Halifax, were Schick-negative. In Montreal, 99.6 per cent of children tested six months after three doses of toxoid (½ cc., 1 cc., 1½ cc.) were Schick-negative (11). The important point, however, is not whether a given prophylactic produces a certain number of Schick-negatives but rather what is its effect in preventing clinical diphtheria in a community. No public health report has claimed complete protection for the entire group inoculated with diphtheria toxoid. Ross and McKinnon (12) showed a 90 per cent reduction in the expected number of cases of diphtheria among 16,829 children who received three doses of toxoid.

In discussing the occurrence of 21.6 per cent of cases among the Schick-negative group, two factors which must be considered are the high virulence of certain *gravis* and *intermedius* strains and the dosage of organisms under crowded wartime housing conditions and epidemic prevalence of the disease in Halifax. However, another point of major importance is frequently overlooked. Such observations should be interpreted in terms of the numbers and in the population groups at risk. This may be illustrated by a simple mathematical example. Let us take a school population of 10,000 of which 95 per cent have been immunized. There are, then, 9,500 immunized and 500 non-immunized. Let us further assume that we expect a 90 per cent reduction in diphtheria in the immunized group. If we assume an attack rate of 20 per 1,000 for the non-immunized, there would be 10 cases among the 500 non-immunized persons. If the same rate were applied to the 9,500 immunized, we would expect 190 cases, and if the assumed 90 per cent reduction took place there would still be 19 cases. In other words, despite a 90 per cent reduction in diphtheria morbidity among the immunized, there would be nearly twice as many cases as in the non-immunized. The casual observer who saw all these cases in a community hospital might, if he did not

consider the size of the groups at risk, assume that immunization not only was useless but actually predisposed to diphtheria. How different the picture when we express our results in terms of the cases which have been prevented rather than in numbers or percentages which take no account of the groups at risk.

The changing wartime population of Halifax during the period under review and the incomplete knowledge of the state of immunization of the adult group do not permit determination of diphtheria rates in relation to the groups at risk. However, the school age-group 6-14 years provides some material for rough calculation—rough in that the figures at hand do not provide for statistical correction for such factors as age and sex distribution within the group, monthly exposure rates, monthly changes in immunization status, etc.

A survey made by the Department of Public Health and Welfare in Halifax showed that, in 1943, 96 per cent of school children had received a complete course of toxoid or had shown a primary Schick-negative test. In other words, there were 19 Schick-negatives—using this term as previously defined—to 1 who refused to be Schick-tested or "toxoided". Between January 1, 1943, and January 1, 1944, there were 38 cases of diphtheria, with no deaths, among the former group, and 26 cases, with 2 deaths, among the latter. Thus the ratio of cases between the two groups, instead of being 19:1, as might be calculated on the basis of the numbers at risk, was actually 38:26 or 1.46:1; that is, there was in reality among the Schick-negative group only 7.7 per cent of the number of cases this group would be estimated to give on a population basis. Conversely, there was 92 per cent prevention.

It has already been noted that the figure of 92 per cent prevention is a rough calculation. However, it is unlikely that any statistical correction would sufficiently alter the figure to prejudice a statement that the immunization campaign among this school age-group in Halifax has achieved remarkable results.

Summary

1. One thousand and twenty-eight cases of diphtheria admitted to the Infectious Diseases Hospital, Halifax, N.S., are reviewed.

2. Forty-five per cent of the cases were over 15 years of age.

3. Eighty-six per cent of 44 deaths were under 15 years of age.

4. There was one death in a child who had shown a primary Schick-negative test two years and five months previously, and one death occurred in a child who had received three doses of fluid toxoid six months previously but had had no post-toxoid Schick test.

5. Twenty-one per cent of the cases occurred in persons who had shown a primary negative Schick test or who had had three doses of toxoid within the previous three years.

6. When the incidence rates in two groups, Schick-negative (natural or induced by toxoid) and others, are calculated, it is found that the rate in the Schick-negative group is approximately one-tenth of the rate in the unprotected population.

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School Medical Services

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FOR many years the school medical service has been recognized as an essential part of a public health program. In opening up a new district, therefore, whether it be under the public health nursing service or as part of a health unit, the school service is usually developed first and as rapidly as possible. It should be borne in mind, however, that the benefit the public health service exerts in the school is dependent not only on the school service but also on the whole community program which reaches into the school from many directions—through the program in sanitation, through general communicable disease control, and ultimately through the infant and preschool program. The school child cannot and should not be segregated from the rest of the community; and no matter how good or how new the school service, it must not be mistaken for, nor permitted to become, a substitute for an adequate community public health service. Overemphasis of the importance of the school services as contrasted with the value of other community public health services must be avoided by public health administrators, and the public health program in any community must be developed with the object of having the school service a part of, but not the whole program.

The school service, as provided in many communities in Canada and the United States at least, has undergone a gradual change over a period of years in an effort to have it meet changing conditions and requirements. In British Columbia the general supervision of the health of school children has been carried out in most districts by a public health nurse and in all districts by a school medical officer. For many years the public health nurse was expected by school boards to spend so much of her time in the schools that she was known more generally as a school nurse. Under the present public health nursing service, while the nurse spends much less time in the schools than formerly, she provides what is considered to be a very satisfactory service, including communicable-disease control, physical inspections, tests for defects of vision and hearing, and any special program for which the school can be used as an outlet.

Until the outbreak of the war, a physical examination of all school children was required as part of the school service. This examination was carried out by a part-time or full-time school medical officer, appointed locally or by the Provincial Department of Health. In recent years the provincial authorities have sanctioned the annual examination of children in certain grades only, namely grades 1, 4, 7, and 10. While this change in policy was made primarily because of the decrease in available medical personnel and because of the increased duties of public health officers in general, the experience of recent years indicates that there is little to choose between the supervision of the health of school children as carried out by the public health nurse and as performed routinely by the school medical officer.

For some time this routine examination of large numbers of school children

already under the supervision of a public health nurse has been criticised by a number of public health officers. It is a costly procedure in both time and money; as a rule it has to be carried out at the expense of other equally important services; it fails too frequently to provide adequate time for special consideration for the children needing it or for the re-examination of selected children where re-examination is ordinarily indicated; and as a rule the examining physician sees the individual child only once a year, and then for just a few minutes, and in any case for much of the information he depends upon the public health nurse, who sees the child many times during the same period.

The procedure followed during the routine examination itself is also open to criticism. In certain respects some procedures can be considered to be unnecessary and essentially useless, whereas in certain other respects the examination is obviously incomplete. A chest examination, for instance, is considered for some reason to be an essential procedure in the routine physical examination of school children. It is recognized, however, that tuberculosis will not be detected in school children, or in many adults for that matter, by use of the stethescope and the usual physical examination as carried out routinely in the schools.

Tuberculosis in school children fortunately is rare. That, of course, is no reason for failure to detect it. In this Province, X-ray examination of the chest is already being carried out in certain districts for older school children and it is anticipated that this service will be extended to a much larger part of the school population within the next few months. In the meantime, it is felt that there is nothing to be gained in so far as tuberculosis is concerned by following the procedure carried out in the past. School children, of course, are subject to infections and conditions of the lower respiratory passage and lungs other than tuberculosis. However, few if any children suffering from acute infections of the lungs will be among those present at the routine school examination. In such instances there are usually other and obvious physical signs that make it clear to the observant teacher or nurse that the child should be at home under the care of the family physician. Such children, therefore, are rarely dependent on the school physician for diagnosis.

Organic disease of the heart fortunately is relatively rare in school children, occurring in about one per cent. Moreover, in our experience practically all children found by the school examiner to be suffering from genuine organic lesions of the heart are already under the care of the family physician and are known to the public health nurse by the time they are discovered in the course of the school examination.

The noting and recording of orthopaedic defects in school children is usually emphasized as an important feature of the examinations performed by the school physician. In actual practice, however, these defects are more usually brought to the attention of the examining physician by the public health nurse and less frequently are discovered by the school medical officer. The finding of such defects in school children merely emphasizes the need for placing more stress on the examination of the preschool child when such defects are more easily and successfully dealt with or actually prevented.

The great bulk of defects found in school children are those having to do

with teeth, vision, tonsils and adenoids. The school physician's examination of the teeth is, as a rule, one which can be duplicated by the public health nurse or the teacher, since the purpose is essentially to detect defects which are visible and apparent without special examination or the use of instruments. Tests for defects of vision are carried out in most schools by the nurse with or without the assistance of the teacher, and such examinations take up little or none of the school physician's time. The majority of defects of tonsils and adenoids are thought by us and others to be as readily apparent to the public health nurse as to the physician.

In considering the common physical defects noted in school children, therefore, it is suggested that the routine examination of heart and lungs might well be omitted, that there is no need for the school physician to spend his time examining children for defects of teeth and vision, and that the public health nurse is quite competent to screen out and refer to the physician for further consideration, those considered to be in need of special advice or examination.

Before making any drastic changes in the local school services, it was decided to make a comparison of the defects noted independently by the public health nurse and the school physician. The Central Vancouver Island district has been served by the public health nurses for a number of years but it has been organized as a health unit for only one year. There has been great variation in school medical examinations, with some schools having had no examination for several years. It was decided, therefore, that the investigation would be particularly worth while under such conditions even though it does repeat, in a general way, work carried out elsewhere.

Children from urban, suburban, and rural schools were included in this survey. All grades from 1 to 9 were represented but the majority were from grades 1 to 6. Examinations and inspections were made in the months of May, June and September.

EXAMINATION OF SCHOOL CHILDREN

CENTRAL VANCOUVER ISLAND HEALTH UNIT

	Examined by Nurse		Examined by Physician	
	Number	Per cent	Number	Per cent
Children examined	767		767	
Total with defects	384	50.0	387	50.0
Defects of tonsils	196	25.5	189	24.6
Defects of teeth	305	39.9	297	38.5
Defects of vision	14	1.8	13	1.7
Defects of heart	7	0.9	10	1.3
Defects of hearing	4	0.5	8	1.0
Orthopaedic	3	0.4	3	0.4
General or below par	41	5.3	42	5.4

Fifty per cent of the children were found by the nurse and by the doctor to have one or more defects. Defective teeth varied in severity from slight defects in one or more teeth to gross defects. The majority of these defects, however, were moderate or slight and many were in first teeth.

Defective tonsils varied from the slightly hypertrophied to the severely

infected. The defects in vision which were noted were for the most part slight with only two severe defects of vision reported.

All defects caused by organic heart diseases were found to be under the care of the family physician.

The conditions included under the term "general" were, in the opinion of the examiner, enough to impair the health of the child and were considered to be due for the most part to defective tonsils and teeth. Defects in hearing were due to wax in the ears or to otitis media. The cases of otitis media were under the care of the family physician. The orthopaedic defects either were slight or were known to the family physicians.

From the findings given above it will be apparent that there is little difference in the results obtained by the two methods of examination. We see no reason, therefore, for continuing the routine examination by the school physician of all school children or children in certain grades as formerly carried out in this Province. The routine examination of school children has, in our opinion, failed not only to justify the time and money spent on it, but also to bring to the attention of the school physician those children in need of a thorough and careful examination. In most schools there are children whose ailments will not be discovered in the course of the usual routine examination of the individual child. These are the children who need a thorough examination and investigation. Not infrequently their complaints are general and indefinite, and the underlying cause of illness or behaviour may be obscure. In our opinion, it is these children who should be referred to the physician from a nurse-teacher conference and receive most of his time and consideration.

Just as this survey was completed, a copy of the Astoria Demonstration Study, "Solving School Health Problems",[1] was sent to us from the library of the Provincial Board of Health. The results of this interesting study, which was carried out in the schools of the Astoria Health District of New York City over a period of some four years, were considered to justify the restriction of medical examinations to those in the first grade and to those children especially referred to the school physician as a result of a teacher-nurse conference. The report states in part (page 30) that: "A check study showed that eight out of ten children selected by the nurse and teacher had a health problem and that few children needing medical attention were overlooked. This method of selecting children to be examined by the physician is now used in all New York City Schools. . . . Not only are the right children getting the attention they need, but also, as a result of these consultations, teachers and nurses are learning more about behaviour symptoms related to physical conditions, as well as how to work together as a team. Nurses, teachers, and physicians like the program; the teacher because she becomes a part of an active process in getting something done for her children; the nurse because it permits her to serve every class in the school as she has wanted to do; the physician because each child now appearing

[1]Nyswander, Dorothy B.: Solving School Health Problems. The Astoria demonstration study sponsored by the Department of Health and the Board of Education of New York City. New York: The Commonwealth Fund, 1942. 377 pages. $2.00 (U.S. funds).

before him offers a challenge to his professional perspicacity in trying to find out why *two* people had believed his services would be of value."

It will be noted that in the New York schools a routine examination is still provided for children in the first grade. In our health unit we feel justified in abandoning even this routine examination in favour of the examination for referred children since our preschool program provides for essentially the same type of nursing supervision and examination of referred cases by the family physician or the school physician as is provided in the school service. Moreover, the names of children entering school for the first time are checked with the school authorities at the time of registration, and arrangements made for inspection of those children not already under nursing supervision. In spite of what has been said in regard to examination of referred children only, it is not our intention to refuse to examine a child if the parents request such examination even though the nurse and teacher have not considered this necessary.

Incidentally, it has been found of interest to make comparisons of the results of the medical examination of school children in New York City, as reported in the Astoria Demonstration Study, with those recorded in the Central Vancouver Island district. The similarity in type of defects by percentage is striking.

	Astoria Demonstration		Central V.I. Health Unit	
	Number	Per cent	Number	Per cent
Children examined	426		767	
Defects found	188	44.0	387	50.0
Orthopaedic	10	2.3	3	0.4
Hearing	4	1.0	8	1.0
Tonsils	102	24.0	196	25.5
Teeth	120	28.0	297	38.7
Below par or general	29	6.8	42	5.5
Heart	8	1.9	10	1.3
Bronchitis	3	0.7		
Lungs	2	0.4		
Eyes	11	2.6	13	1.7

It should be noted that the figures taken from the Astoria Study were obtained from the examination of children entering school for the first time. In our series the children examined were from grades 1 to 9. Moreover, the Astoria study was carried out under pre-war conditions whereas our survey was made during the last few months at the end of the fifth year of war. The chief difference between the two series is found in defects of teeth, which were eleven per cent higher in this district than in New York. The scarcity of dentists in civil practice and the breakdown of school dental programs may be responsible in large part for this difference. Otherwise the results are remarkably similar.

In this province a report form for use by the teacher in recording information concerning the general health and behaviour of school children has been available for some years. This form, with certain modifications adopted from the New York Teacher Report, is now being used in elementary schools in this district and with the information provided by the nurse will form the basis of the nurse-teacher conference for referral of children to the school physician.

In this health unit, the public-health school program provides for conferences

between the staffs of the unit and the various schools at intervals throughout the school year. These meetings provide an opportunity for the discussion of various aspects of the public health program including the school service, and it is interesting to note that in the discussion concerning the changes in school service outlined above, we have met with nothing but approval.

Summary

The usually accepted school medical service as carried out in many parts of this country is criticized from a number of angles. Evidence is submitted to show that the examination of school children as carried out by the public health nurse provides information just as satisfactory as that obtained by the medical examiner. On the basis of the findings reported, the school medical officer in the Central Vancouver Island Health Unit is examining essentially only those children referred to him as a result of a nurse-teacher conference.

Sources of Error in Dietary Surveys

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DURING the past ten years dietary surveys have become more common. The general procedure has consisted of securing records of food purchases or of food intakes, the subsequent calculation of the amounts of various nutrients, and the assessment of these amounts in terms of a set of standards. From these surveys conclusions have been drawn regarding the occurrence of nutritional deficiencies and, in some cases, the conclusions have been sweeping in nature. While evidence of frank deficiency states is on firm ground, the bulk of the data regarding the occurrence of so-called subclinical deficiency rests upon the results of dietary surveys. Comparatively little attention has been given to errors which may be common to all dietary surveys and which may vitiate the validity of the results. Several groups of investigators (1, 2) have pointed out that customary interpretations of dietary surveys do not correlate with clinical findings. This lack of agreement may be due to faults in either or both approaches to the determination of nutritional conditions.

In considering the validity of results of dietary surveys several types of error should be listed:

1. If inferences regarding dietary conditions in a population are to be drawn from a survey of a sample of the population, it is essential that the sample be representative. While specifications may be constructed by statisticians regarding the procedure to be followed in securing a representative sample, the actual sample obtained may be quite different from that specified. It is necessary to secure voluntary co-operation of individuals or families and this is not always possible. If the sample is not representative, it would seem advisable to limit the inferences to the particular group studied.

2. There may be considerable difference between food consumption for a short period and sustained food habits. It may be that food consumption for the period studied was exceptional because the subjects were under observation and were influenced in the choice of food by the scrutiny. Even if that factor is not operating, the constancy of intake of various nutrients is open to question. Because a person has a low intake of thiamin on one day or during one week, there is no assurance that he has had such a supply for some time or is so accustomed. It is common practice to conclude from a survey of perhaps one week that the results represent the nutritional conditions in the sample of the population; this ignores variability in food intake. It is unlikely that the nutritional status of an individual will be influenced by a low intake for a single day or for a short period.

3. Aside from variability, the record of food intake may not have been accurately made. In the type of survey in which food purchases, or indeed food consumption, are recorded by trained observers, one may conclude that reasonably accurate records are obtained. In cases in which the recording is done by the subjects, the data are frequently open to question. In many surveys estimates

of food consumption are obtained from questionnaires about food habits; the value of such estimates is highly debatable (3).

4. There may be considerable discrepancy between the calculated quantity of nutrient and the amount actually secured by the subject. In most surveys the amounts of various nutrients are calculated by the use of tables of food composition; values given in such tables may be quite different from the actual composition of the foods eaten. Losses in cooking may contribute significantly to this error. Waste, both in preparation and at the table, may be neglected in computation and serious error may result. Methods of calculation vary from one survey to another and have different degrees of accuracy.

The errors listed above affect the accuracy of the data obtained in a dietary survey. After the data are secured, it is current practice to assess for adequacy the quantities of nutrients, presumed to be received, in terms of dietary standards. In the United States and Canada the recommended allowances of the U.S. Food and Nutrition Board (4) are frequently used as standards. They were not intended to be so used but they were employed in this way in a publication of the Food and Nutrition Board (5). Most of the evidence for the existence of subclinical deficiencies rests upon this type of evidence. Data are gradually accumulating to show that these interpretations are open to question (6).

Since sweeping claims are made frequently regarding the extent of nutritional deficiencies and since such claims form a considerable portion of the argument for the enrichment of bread and other foods and for the use of vitamin supplements, an examination of the errors involved in dietary surveys is advisable. The balance of this paper is devoted to a consideration of the factor of variability of food consumption.

A Study of Variability of Food Intake

In an attempt to secure information regarding the reliability of food records for a single week, or for a shorter period, as an index of food consumption, a study has been made of food consumption by a group of "normal" persons. The group consisted of 31 persons; this is admittedly a small group. Moreover, all were persons with some scientific training. About one-half of the group were university graduates in medicine or in some branch of science; the balance were laboratory technicians. All of the group realized the need for accuracy in recording food intakes and special attention was given to this. About ten in the group were directly concerned with nutritional research. It is likely that the records obtained were more accurate than would be secured from the general public. One might expect, also, that supplies of various nutrients would be more uniform because of the interest in nutrition.

Each person was asked to record all food eaten for the first week of each of twelve consecutive months. The amounts of different nutrients were calculated from a set of tables of consumption used in previous surveys in this laboratory (2). In recording food intakes the sizes of the servings were described as closely as possible; in calculations the weights of the servings were estimated. Although

this gives a source of error in the values for the nutrients, previous work had indicated that this error is not likely to exceed 10 per cent.

Values for different nutrients were assessed in terms of the recommended allowances of the U.S. Food and Nutrition Board and the number of persons having less than 70 per cent of the recommended allowances was obtained. This information for each period of recording is given in Table I. It is common practice in dietary surveys to use such information as an index of nutrition "adequacy". It is evident from Table I that, using this procedure, supplies of calories, protein, calcium, iron and vitamin A were generally "adequate" and were fairly consistently so from period to period, although there is a suggestion of variability in the case of calcium. The number of persons showing "inadequacy" of supplies of thiamin, riboflavin and of ascorbic acid showed marked

TABLE I

NUMBER OF PERSONS HAVING LESS THAN 70 PER CENT OF RECOMMENDED ALLOWANCE EACH WEEKLY PERIOD

Nutrient—	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Calories	0	0	0	0	0	1	0	0	0	0	0	0
Protein	0	1	0	0	0	1	0	0	0	0	0	0
Calcium	1	1	1	1	2	2	1	3	2	2	2	2
Iron	0	0	1	0	0	2	0	0	0	0	1	0
Vitamin A	1	1	0	0	0	0	0	0	0	0	0	0
Thiamin	8	6	5	5	9	12	4	9	11	11	14	9
Riboflavin	5	8	5	11	10	12	12	10	11	11	9	12
Ascorbic Acid	11	9	5	6	7	5	3	7	8	16	16	7

TABLE II

NUTRIENTS CALCULATED FOR ONE PERSON DURING EACH WEEKLY PERIOD

Nutrient—	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Calories	2139	1862	1992	2312	2193	2233	2186	2231	1914	2244	2252	1939
Protein (g.)	64	57	64	68	68	80	72	71	61	70	65	68
Calcium (g.)	0.99	0.92	0.97	1.29	1.09	1.19	1.02	1.01	0.92	0.85	1.08	0.92
Iron (mg.)	11.3	9.6	9.9	11.3	12.4	12.1	13.2	11.1	10.8	12.8	11.0	9.9
Vitamin A (I.U.)	3907	3855	3891	6876	5247	7845	5912	6312	6933	5230	8184	5019
Thiamin (mg.)	1.0	1.0	1.0	1.0	0.9	1.0	1.0	1.4	0.9	1.0	0.8	0.9
Riboflavin (mg.)	1.6	1.7	1.6	1.8	1.7	1.8	1.8	1.6	1.6	1.3	1.6	1.4
Ascorbic Acid (mg.)	69	62	55	76	69	126	98	92	87	59	61	66

variability. It is obvious that quite different interpretations could be secured depending upon which period was chosen. If food intakes for this group had been recorded for one week only, the results would have varied greatly depending upon which week was used.

As judged by Table I, the amount of variation from period to period would be considered to be small for all nutrients except three vitamins, but actually there were large variations for all nutrients for every person. As an example of this variation, Table II shows the amounts of various nutrients calculated for the food intake of one person. The variations are sufficiently clear as to render comment unnecessary.

TABLE III

VARIANCE OF SEVERAL NUTRIENTS

	Degrees of Freedom	Cal.	Prot.	Fat	C.H.O.	Ca.	P.	Iron	Vitamin A	Thiamin	Ascorbic Acid	Riboflavin
		***	***	***	***	***	***	***	***	***	***	***
Persons	30	24820.0	2513.43	4150.97	43353.6	0.8168	0.9790	85.86	6070.83	0.4137	3911.55	2.7753
		*	**	*		*	*	**		***	***	*
Between Seasons	3	2256.7	360.00	704.66	2726.3	0.0863	0.0979	15.64	240.33	0.2267	4150.33	0.2800
					*	*			*	*	**	
Persons X Between Seasons	90	847.9	96.62	194.93	1758.80	0.0282	0.0315	3.13	1153.33	0.0388	514.40	0.0977
		***	***	***	**		**	**		***	*	
Within Seasons	8	2952.3	351.25	715.00	4401.25	0.0241	0.0796	9.59	1281.37	0.0988	798.56	0.0838
Persons X Within Seasons	240	727.9	74.31	182.83	1281.3	0.0207	0.0262	3.03	735.40	0.0208	290.01	0.0734
Persons X Months	330	760.6	80.40	186.13	1411.53	0.0228	0.0276	3.06	849.38	0.0257	351.86	0.0800

*denotes significance at the 5% level.
**denotes significance at the 1% level.
***denotes significance at the 0.1% level.

Consideration of the data has been restricted so far to the type of interpretation commonly used in dietary surveys. A statistical computation, employing the analysis of variance technique, was made in an attempt to ascertain whether there were significant variations from season to season, or among months within each season, or whether the variations were fortuitous. March, April and May were considered to be spring months, and September, October and November were assigned to fall. The values of the variance in regard to each nutrient are given in Table III. "Persons" variance is a measure of the variation of the individual weekly averages for twelve periods for the 31 persons in the study. "Between Seasons" represents the variation among the four average values of the diet of the entire group for the different seasons. The interaction "Persons X Between Seasons" may be interpreted as a measure of the lack of uniformity in the diets of the 31 persons throughout the four seasons. The variance "Within Seasons" is the variation of the average diet among the three months within each season. The interaction "Persons X Within Seasons" is a measure of the discrepancy in the variations of the diets of the individuals throughout the three months within each season. The interaction "Persons X Months" represents the discrepancy in the diet variation of the 31 persons throughout the 12 months.

An examination of Table III shows that the variance due to persons is extremely large for all nutrients. From the viewpoint of the current method of interpreting dietary surveys this variation is of great importance; its size amply justifies the conclusion previously advanced that the results of surveys of food intake for a period of seven days must be accepted with more than customary caution. In fact, the size of the variation leads to the conclusion that dietary surveys for a period of one week should not be used to ascertain the extent of deficiencies in persons having, as had the group under study, a free-will choice of foods.

With the exception of carbohydrate and vitamin A there is significant variation for all other nutrients from season to season. For separate months within each season the variation in regard to calories, fat and phosphorus is markedly large. Only in the case of one nutrient, vitamin A, was the supply sufficiently uniform to prevent a significant variation from season to season or from month to month. Considering these two types of analysis jointly, it can be noted that most marked variation was found for protein, iron, thiamin and ascorbic acid; least variation was shown for vitamin A and riboflavin.

Table IV shows the correlation existing in the case of thiamin, riboflavin and ascorbic acid between the number of persons each month whose intake is below 70 per cent of the standard and the mean monthly intake value for the whole group. It is to be expected that, when the mean intake value of the group is high, the number of "deficient" persons will be low. The negative correlation coefficients, significant at least at the one per cent level, corroborate this expectation. The large fluctuation in the number of persons each month whose intake is low is no surprise when it is remembered that the variation among the average values of the whole group throughout the months is statistically significant.

Another procedure which might conceivably yield misleading results is that which consists in taking a survey for a period of less than one week. Leverton and March (7) have reported that a period of less than seven days is undesir-

TABLE IV

CORRELATION OF NUMBER OF PERSONS HAVING LOW INTAKE WITH MEAN INTAKE OF GROUP

	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
THIAMIN												
Number below 70%	5	9	12	4	9	11	11	14	9	8	6	5
Mean Value of Intake	1.04	0.98	0.92	1.05	1.07	0.99	0.95	0.92	1.06	1.10	1.05	1.11
	Correlation Coefficient −.775**											
ASCORBIC ACID												
Number below 70%	6	7	5	3	7	8	16	16	7	11	9	5
Mean Value of Intake	71.4	70.4	77.1	78.9	69.2	69.5	55.4	55.3	69.1	71.2	71.5	74.0
	Correlation Coefficient −.932***											
RIBOFLAVIN												
Number below 70%	11	10	12	12	10	11	11	9	12	5	8	5
Mean Value of Intake	1.71	1.67	1.57	1.66	1.69	1.68	1.69	1.66	1.75	1.77	1.76	1.83
	Correlation Coefficient −.721**											

**denotes significance at the 1% level.
***denotes significance at the 0.1% level.

TABLE V

NUMBER OF PERSONS HAVING LESS THAN 70 PER CENT OF RECOMMENDED ALLOWANCE EACH DAY DURING ONE WEEK

Nutrient—	Tues.	Wed.	Thur.	Fri.	Sat.	Sun.	Mon.	Based on Week's Average Intake
Calories	0	0	1	0	1	3	2	0
Protein	0	0	0	0	1	3	0	0
Calcium	2	3	1	2	6	10	5	2
Iron	1	0	1	2	1	0	0	0
Vitamin A	2	2	3	3	1	4	4	0
Thiamin	15	15	13	14	15	16	13	12
Riboflavin	11	11	8	11	12	19	15	11
Ascorbic Acid	18	14	17	15	16	17	13	16

able. Our data were examined further to ascertain the daily variation of intake of the various nutrients during one week. As an example of such variation Table V shows the number of persons who received less than 70 per cent of the recommended allowances each day during a week. The greatest fluctuations obvious in this table appear in the case of calcium and of riboflavin; this is substantiated by an analysis of variance which showed significant daily variation of the average intake values of these particular nutrients. While these observations arise from data secured for one particular week, there is reason to suggest that wider inferences could be drawn. The reliability of survey periods of less than one week appears to be less than for surveys of seven days; the validity of the latter as a picture of sustained food habits has been questioned above.

SUMMARY

In a study of food intake of a group of "normal" persons, it was found that the use of records for one week as an index of dietary adequacy gave results quite variable during twelve periods of observation. A period of less than one week was less accurate than a study through seven days. Misleading information derived from a dietary study for a short period may be one of the factors causing a discrepancy between calculated dietary adequacy and the actual condition of the subject.

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Cases of Exposure to Methyl Bromide Vapours

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METHYL bromide or bromomethane is a compound of the halogenated hydrocarbon family; it belongs to the group of anaesthetic gases and vapours which may produce organic changes when absorbed by men or animals. Its chemical formula is CH_3Br. It has a density of 1.732 and a molecular weight of 94.95. According to the "Handbook of Chemistry and Physics" (27th edition), its boiling point is 3.56° C.; however, in all the rest of the literature consulted (1, 2, 3) it is given as 4.5° C. or 4.6° C. The melting point is –93.66° C. It is slightly soluble in water but dissolves readily in alcohol, ether, chloroform, carbon disulphide and benzine. At room temperature it is a colourless gas with no specific unpleasant odour.

In industry, methyl bromide is used as a fumigant, as a refrigerant agent, and in the manufacturing of fire extinguishers.

The toxic properties of methyl bromide have long been known, cases of poisoning having been reported as far back as 1889. However, it was not until a few years ago that extensive studies to determine its potency as a toxic material were made. In fact, researches conducted by Irish, Adams, Spencer and Rowe (2, 4) were prompted by the possibility of a widespread use of methyl bromide as a fumigant and it was imperative to learn more about its physiological effects in men and animals.

Following experiments on laboratory animals, it has been observed that methyl bromide, once absorbed in the body, is partially dissociated into methyl alcohol and alkaline bromides—two toxic compounds. The proof that methyl bromide partially dissociates seems to be established by the fact that if methyl alcohol and sodium bromide are administered to rabbits in amounts which in the case of methyl bromide would produce poisoning, symptoms of poisoning are much less severe with the former substances than with the latter. Irish, Adams, Spencer and Rowe conclude therefore that the toxicity of methyl bromide is due to a great extent to the undecomposed methyl bromide.

Henderson and Haggard (1) state that the degree of toxicity of methyl bromide inhaled from the air cannot be explained merely on the basis of poisoning by the methyl alcohol formed on decomposition. In fact, methyl chloride absorbed from the air is far less toxic than methyl bromide, although gram for gram the former will yield almost twice as much methyl alcohol as the latter. They agree that the bromide formed might contribute appreciably to the toxicity of methyl bromide. The same authors add that because of its decomposition methyl bromide cannot, of itself, accumulate in the body to the point of equilibrium and consequent

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cessation of absorption; the absorption with formation of methyl alcohol continues as long as exposure lasts, so that poisoning by methyl alcohol might result after prolonged exposure to low concentrations of methyl bromide. Henderson and Haggard (1) have also pointed out the possibility that undecomposed methyl bromide may enter the intracellular water of the body and thereby cause more severe symptoms. The bromide formed within the body cells might be eliminated very slowly. This may explain why recovery is long delayed in methyl bromide poisoning.

In the determination of a threshold concentration a wide range of variations has been obtained. Sayers, Yant, Thomas and Berger report that concentrations varying from 50 to 170 p.p.m. cause slight symptoms after an 8-hour exposure. Watrous (5) reports that men exposed to concentrations generally lower than 35 p.p.m. have shown physiological changes after prolonged exposure. Henderson and Haggard (6) suggest 50 p.p.m. as an acceptable limit. Others recommend that 25 p.p.m. should never be exceeded until more definite information is obtained about this compound.

Some months ago, three cases of what appeared to be poisoning by methyl bromide occurred in a plant where fire extinguishers were being filled. In this particular type of fire extinguisher either pure methyl bromide or a mixture of 20 per cent carbon tetrachloride and 80 per cent methyl bromide were used.

Dr. Norman Viner, of Montreal, who recently reported two of the three cases at a meeting of the Montreal Medico-Chirurgical Society, was kind enough to furnish us with the clinical history of his two patients.

Case "A," who had been working at the plant for about three weeks, was admitted to hospital in a state of convulsion. He had four distinct convulsions before death occurred. A twitching of the whole body was also noticed. He recovered consciousness for a while and complained that his work of filling extinguishers was responsible for his condition. He also vomited a great deal. A blood analysis showed 211 milligrams of bromide per 100 cc. of blood. The normal content of bromide in the blood is about 10 to 30 milligrams. The patient showed a high normal haemoglobin and a high normal red-cell count. Accordingly there was no reason to believe that anaemia was present. The reflexes were normal and routine urological examinations showed no abnormal condition. There was no Babinski, but a very slight Chaddock in both feet was noticed. The patient died in less than four days. A post-mortem showed a congestion of the brain and lungs, tiny haemorrhagic spots in the viscera and a greenish slime all along the oesophagus.

Case "B," who recovered, was also admitted to hospital and stayed under treatment for 12 days. He had been working at the plant, filling extinguishers, for the last two years. For quite a while before he stopped work, writing, as well as the use of instruments of precision, had become difficult for him. This patient used to be alert mentally but he began to show a tendency to drowsiness, and, to use his own words, he once nearly fell down. At the hospital he had four convulsions but they were not so severe as those of "A." The same twitching of the body was noticed; the muscles of the side of the abdomen and of the thigh particularly were involved. The Chaddock sign could not be detected; nor was

there any Babinski. Reflexes were normal but in routine examination methyl alcohol and bromides were detected in his urine. Blood analysis showed a content of 55 milligrams of bromide per 100 cc. of blood and a subsequent test showed a content of 30 milligrams per 100 cc. As in case "A," there was no apparent anaemia, "B" showing a high normal haemoglobin and a high normal red-cell count. During his two years in the filling department of the plant, he had frequent respiratory trouble similar to a cold.

The Journal of the American Medical Association recently reported three cases of industrial poisoning from methyl bromide. Histories of 42 other cases, with 12 deaths, have been reported in the literature. Most of these occurred in Germany and Switzerland. The following description of the symptomatology coincides almost exactly with the symptoms found in case "B":

The contact of the methyl bromide with the skin often causes a second-degree burn with perhaps a blistering of the finger. There is some tingling of the fingers; they feel cold. After a while, an irritant cough develops and greenish sputum is expectorated. There is a feeling of fullness around the forehead similar to that from a cold or sinusitis. The patient begins to feel tired. He may present a certain amount of tearing of the eyes. He may also have flashes of light in the eyes; one case reported in the literature had flashes of blue light in the eyes. There is a constant taste or smell of burning rubber so that even food and drinks seem to have that taste. The smoking of cigarettes becomes unpleasant. As the illness grows worse, the eyes become weak and the gait may become somewhat ataxic. Later, the hands become unsteady and shaving and writing and the use of precision tools become impossible. The movements of the hands or fingers becomes jerky and tortuous. At the same time pain occurs in the fingers and there is an obvious dullness of the mind. Finally, the patient reaches the convulsion stage which may be associated with unconsciousness or incontinence or both. In some cases the outcome has been death. In others, recovery may be slow with a certain amount of inability to use precision instruments. This condition may persist for months even after the patient has been removed from exposure.

In animals, according to Sayers and Yant of the United States Public Health Service (7), after a single exposure to a high concentration of ethyl or methyl bromide or of ethyl chloride, and after long exposure to low concentrations, degenerative changes in the organs were noted, especially in the kidneys. For short exposures, ethyl bromide and ethyl chloride are less toxic than chloroform, carbon tetrachloride or even gasoline, but for longer exposures are about equal. Methyl bromide, however, is markedly more toxic in exposures of thirty minutes or longer. Adams, Irish, Spencer and Rowe (2) reported that at a concentration of 17 p.p.m. no symptoms were apparent in rabbits, rats, monkeys and guinea pigs. At a concentration of 33 p.p.m. rabbits showed paralysis. At a concentration of 66 p.p.m. rabbits showed paralysis and lung irritation, while monkeys showed nervous reactions. At higher concentrations all these animals showed symptoms.

After a survey of the plant, arrangements were made with the management to collect samples in the filling department in order to determine the extent of the exposure. Before discussing the data gathered during the course of this investigation however, a description of the process and of the filling operation is essential. First, the methyl bromide or the mixture of methyl bromide and carbon tetrachloride was cooled in a refrigerating unit to approximately 20° F. From this cooler a pipe brought the liquid into two exhaust hoods which were mechanically ventilated. The material was poured under these hoods into chilled extinguishers. The amount of liquid necessary to fill the extinguisher was measured by placing the latter on a balance under the hood. To eliminate too much waste in pouring, a small copper pipe was fitted to the end of the distributing

pipe. The valve controlling the flow of liquid was about one foot from the end of a flexible tube inserted in the bottle. Once the filling was done, nitrogen was introduced under pressure and the extinguisher was then capped.

There were two exhaust hoods where this filling was done: the first hood appeared to be of poor design while the second seemed to be quite up to usually accepted standards. Four different types of extinguishers were filled, two under each hood. During the filling operation, one could easily discern the procedures during which the methyl bromide vapours were likely to reach the worker; if an excess of methyl bromide or of the mixture was poured into the bottle, this excess was simply thrown inside the hood by the operator. In so doing, the workers also dropped some on their hands, thus increasing the possibility of a greater concentration of the vapours in the air surrounding the worker. While the bottle was being transferred to the capping machine, there was further danger of diffusion of the vapours into the air. Lastly, the liquid remaining in that part of the pipe connected with the valve, and which was inserted into the bottle during the filling operation, was likely to evaporate readily in the atmosphere because of its open outlet.

This was especially true at hood no. 1, which, as stated before, was of poor design. A total of eleven air samples were taken on two different occasions in order to determine the concentrations of methyl bromide in the working room. The sampling time of the first three samples was one hour. The rate of the sampling was one litre an hour. The samples were collected by passing air through ethanol amine, which acted as an absorber, by means of a one-litre syphoning bottle filled with water. When these samples were collected, however, production was at a minimum and the amount of filling done was equivalent to less than one-fourth of the regular output. The result was that the concentrations obtained were low and did not, in our opinion, represent the true conditions: 0.79 p.p.m. and 0.63 p.p.m. were obtained at breathing level near hood no. 1, and 0.45 p.p.m. in the general atmosphere of the room.

No samples were taken at hood no. 2, because no work was being done at this particular place when the first study was conducted.

Some weeks later, eight other samples were taken. On this occasion, production was at its normal rate. The combustion apparatus was used for the collection of these air samples and the subsequent analysis was made by the Volhard Standard Volumetric Method. The time of sampling was one hour for six of the samples and thirty minutes for the two others, at a rate of two litres per minute. Three samples taken in front of hood no. 1 gave 385 p.p.m., 390 p.p.m., and 297 p.p.m. respectively. A concentration of 19.1 p.p.m. was obtained in front of hood no. 2. A concentration of 0.2 p.p.m. was obtained in the general atmosphere when filling was done at hood no. 1 only; this sample being taken approximately six feet from the hood.

Another sample of the general atmosphere was taken when filling was done at both hoods and while a methyl bromide tank was being changed; this time the concentration obtained was 11.4 p.p.m. Finally, two samples taken near

the capping machine which had no exhaust hood gave a concentration of 37.4 p.p.m. and 64.0 p.p.m. respectively.

These results seem to confirm that hood no. 1 did not effectively control the vapours during the filling operation. This fact was further established when the air velocity was measured at the opening of both hoods. The instrument used for this purpose was the anemothermometer. Hood no. 1, which had a face area of 20.5 square feet, gave a mean air velocity of 78 f.p.m. or a displacement capacity of 1600 c.f.m. Hood no. 2, which had a face area of 18 square feet, gave a mean air velocity of 140 f.p.m. or a displacement capacity of 2,500 c.f.m. Measurements of air velocity were also taken one foot from the face of hood no. 1; at this point, the mean air velocity obtained was 65 f.p.m. These results seem sufficient to explain the high concentrations of methyl bromide vapours obtained at the breathing level near hood no. 1 and to establish the fact that hood no. 1 was probably the source of most of the trouble. The workers themselves said that they noticed a big difference between the efficiency of the two hoods.

Besides the fans provided for these exhaust hoods, there was a third fan connected to two pipes which had openings two inches from the floor. The capacity of this fan was 3,800 c.f.m. This local exhaust ventilation system was installed to take care of the vapours which might escape through possible leaks from the tanks or the piping system; methyl bromide vapours have a high density and therefore have a tendency to settle at floor levels.

The present study appears to indicate that the workers who were assigned to the filling operation in this plant were exposed at times to rather high concentrations of methyl bromide vapours. It is not likely that carbon tetrachloride was involved in the three cases of poisoning to which we refer in this study, because of the small amount used in the filling operation and because of its high boiling point (76° C.) compared with that of methyl bromide. The authorities of the plant in this particular case did their utmost to protect their employees and could reasonably believe that the ventilation system they had installed was adequate.

Hatch and Walpole Jr. (8) state that a review of the problems involved and procedures employed in the design of exhaust hoods for industry reveals two striking situations: first, the design of such equipment is almost entirely empirical; and secondly the performance of systems so designed has been correlated with the resulting degree of control of the contaminant in very few cases. It has also been said that the design of every exhaust system is a separate problem requiring independent solution and that previous personal experience rather than the application of general engineering laws must be the basis of design.

The authorities of the plant have lost no time in trying to improve the efficiency of their ventilating system and to modify their method of operations, so that even unnecessary exposures through neglect on the part of the workers will be impossible. The management has devised a machine which will permit the filling to be done in a closed circuit. This new installation will be designed in such a way that the extinguisher will be filled, capped and finished without permitting any of the methyl bromide to escape. Furthermore, it will be installed in exhaust hoods with a recommended face velocity of not less than 150 f.p.m., preferably 200 f.p.m. Another interesting feature of this new equipment is that it

will be impossible to pour more than the necessary amount of liquid into the extinguishers. This will eliminate the dangerous practice of throwing excesses of the liquid into the hood and also prevent any contact with the hands, since absorption of methyl bromide may occur through the skin. It has been observed that chapping of the articulations of the fingers is prevalent among the workers assigned to the filling operation and that lost time frequently results. Until the new installation could be put in operation, the following control measures were recommended:

1. Blocking of certain parts at the face of hood no. 1 in order to increase the air velocity in the hood.

2. Frequent periodical medical examinations of the workers employed in the filling room.

3. Periodical air sampling to verify the efficiency of the additional measures taken to protect the workers.

The chemical determinations in this study were made by Mr. Jean Paul Paré, M.Sc., chemist of the Division. Mr. Bernard Beaupré, M.Sc., C.E., Industrial Hygiene Engineer of the Division, participated in a preliminary survey of the plant.

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Mortality Reductions in Ontario, 1900-1942

III

The Age Groups of 50 and Over

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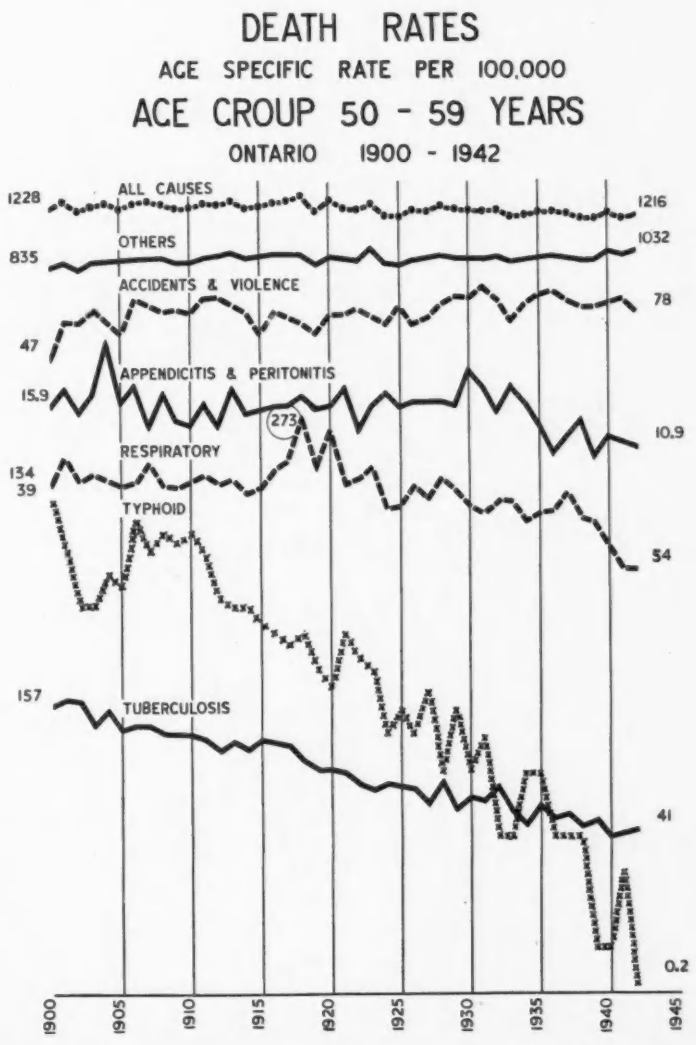
IN a review (1) of mortality in Ontario from 1900 to 1942, it was shown, firstly, that there was no decline in the death rates in the age groups of 50 and over; secondly, that there was a marked decline in the age groups under 50; thirdly, that in the 40 to 49 age group the decline amounted to fully one-third of the rate in 1900, in the 30 to 39 age group, fully one-half; and in all age groups under 30, fully two-thirds of the rates in 1900 and more than double the rates in 1942. It was further shown (2) that these declines were due, according to the records of vital statistics, mainly to declines in the death rates of a comparatively few specific causes or groups—diarrhoea and enteritis of early life, the communicable diseases of childhood (principally diphtheria), tuberculosis, typhoid fever, respiratory disease (including influenza), appendicitis and peritonitis, rheumatic heart disease, and diseases associated with pregnancy. As tuberculosis, typhoid fever, respiratory disease, and appendicitis and peritonitis are not confined to age groups under 50, but play a definite part, too, in the death of those over 50, the question arises as to why the rates of all causes in these older age groups do not show reductions equal to and the consequence of the declines in these specific causes. For consideration of this, the death rates of these causes in the age groups of 50 years and over are outlined herewith. As, in the older age groups, the death rates of accidents and violence show an increase, probably real, these rates are outlined also; and, as before (2), the rates for all other causes and all causes.

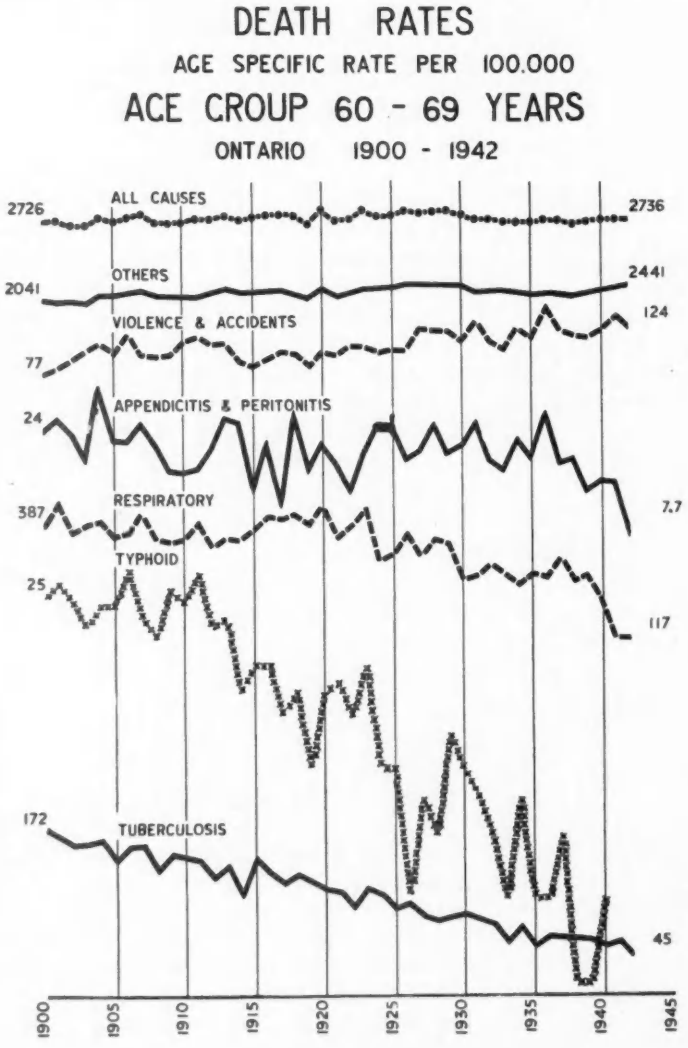
The Age Group 50-59

Here, in plate 1, it is quite apparent both in the general lie of the line indicative of the total rates and in the figures quoted for 1900 and 1942 that there is no significant decline in the rate of all causes for the 50-59 age group. The difference between the 1900 and 1942 rates per 100,000 is only that between 1228 and 1216, both figures being fairly representative of the whole period and the difference, insignificant. The rates of tuberculosis, on the other hand, show a decrease of 116, respiratory disease, a decrease of 80, typhoid fever, 38.8, and appendicitis and peritonitis, 5; altogether these declines total 239.8. Offsetting a small part of these declines, there is an increase in the death rates of accidents and violence from 47 to 78, which thus reduces the identified decrease to 208.8. In this and older age groups, the causes specified account for a much smaller and decreasing part of the total death rate than do these causes in earlier age groups. Even the complete elimination of all these causes of death could effect a reduction of only about one-third in the total rate; the partial declines in them, therefore, must effect proportionately less. Nevertheless, the total recorded decline in these

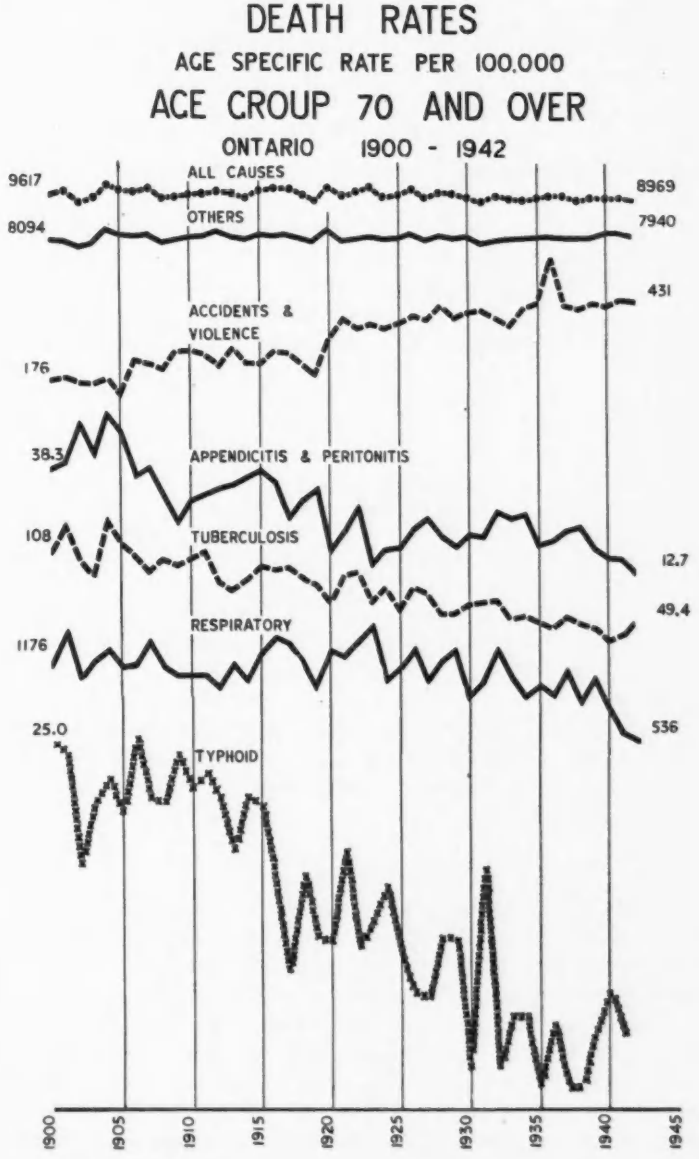
causes after deducting the increase in accidents and violence is, as indicated, approximately 200, which figure is not insignificant in comparison with the total rate. Had this decrease not been offset in some way, the level of the rates for all causes in the last few years would be in the neighbourhood of 1000 instead of 1200 per 100,000. It has been offset by an approximately equal increase in other causes of death, and in this group it is to heart disease and cancer that most of the increase is charged; a small part (about 20) is charged to diabetes. How much of the latter increase is real, in spite of the availability of a specific therapeutic agent, is, by common consent, very questionable; some of it may be due



here, as in older age groups, to the saving of younger lives which finally succumb to the same cause, diabetes, in later life; some part may be due to changes in diagnosis and in certification. If accurate rates for pernicious anaemia were obtainable over the period, they might show much the same picture, and the same explanation of the increase in older ages would possibly be applicable (it is considered that the recorded rates for pernicious anaemia are not sufficiently indicative of the true picture to warrant using them as a basis for comparison). It is quite probable, too, that a part of other saving in younger age groups, especially that in tuberculosis, in heart disease, and even in cancer, carries into older



age groups sub-standard individuals with a life expectancy lower than the average for the group; some of these sub-standard entrants succumb finally to the condition from which they escaped death at an earlier age and some succumb prematurely to other causes. They tend thus to increase the total death rate in the older age groups and maintain it at its previous level in spite of the declines



in certain causes. Another factor, too, is that in the aging population of Ontario, where older ages form an increasingly greater part of the population, there is also an aging within the 50-59 age group, with the senior years making in 1942 a slightly greater proportion of the group's population than in 1900; this shift, however, would account for very little increase in the death rate of the group as a whole. Whether or not these various factors fully account for the failure of the total rate in the 50-59 age group to fall by approximately 200, or whether there may have been, in heart disease, and/or cancer, an actual increase of some very small extent, remains thus a question.

The Age Group 60-69

In the 60-69 age group there is much the same situation. There is no decline in the rate of all causes in spite of a decline in tuberculosis, typhoid fever, respiratory disease, and appendicitis. The declines recorded, 127 per 100,000 in tuberculosis, 25 in typhoid fever, 270 in the respiratory group, 16.3 in appendicitis and peritonitis, aggregate 438.3. The increase in accidents and violence is 47. The net decline so identified is thus approximately 400 per 100,000. Instead of the rate of all causes falling by this amount to the level of 2300, the rates of other causes, increasing by an equal amount, maintain it at its previous level. What has been said in consideration of the rates in the 50-59 group applies here also.

The Age Group 70 and Over

In spite of the irreparable loss of such ripe experience, so sorely needed by those of younger years, the scheme of things requires that all who enter this final age group of 70 and over die in it. There cannot, then, be any constant decline in the group as a whole, any decline being followed inevitably by an increase. Though certain specific causes may fall, their place is soon taken by other causes. There is little purpose therefore in considering declines in this group. However, for the individual who has reached three score and ten, the hazard of tuberculosis, typhoid fever, respiratory disease, and appendicitis, very slight though it is in comparison with the hazard of old age itself, is less than it was in 1900, but even that gain is partly offset by an increase in deaths from accidents and violence.

Summary

In spite of the declines in the death rate of tuberculosis, typhoid fever, respiratory disease, appendicitis and peritonitis, and possibly in other causes, not identified, in the 50-59 and 60-69 age groups, the total rates for all causes in these age groups show no decline but are maintained at a fair level by increases in other causes including accidents and violence. How much of the increases in other causes is due to bringing into these age groups sub-standard people, saved from earlier death by the many factors that have reduced mortality in age groups under 50, what small part is due to an older age distribution within these older age groups, and how much, *if any*, is due to actually increased mortality

hazard in any causes such as heart disease or cancer—these questions are raised again (3), but not answered.

As death is inevitable in the age group 70 and over, despite declines in certain causes no permanent decline in the total death rate in this age group can be anticipated.

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TWO FORGOTTEN ASPECTS OF NUTRITION

FOR several years an enthusiastic interest in the vitamins has been popular in nutrition. This has been engendered by the discovery of a series of vitamins, by their isolation, and by the large-scale manufacture of them. From this interest a widely-accepted concept has developed that a considerable incidence of mild deficiencies exists, even in countries with a high standard of living such as Canada and the United States. It has been claimed that these sub-clinical deficiencies affected the level of health and vitiated working efficiency. In an editorial in the Canadian Medical Association Journal, Dr. Pedley pointed out that the claims appeared to be fallacious and that interest in them was obscuring an aspect of nutrition which was of definite importance in relation to health. The aspect to which Dr. Pedley referred was the rather common occurrence of obesity in persons past forty, with proven ill-effects upon health and longevity. So great has been the interest in deficiencies that it has become most unpopular to refer to a condition of excess nutrition. Data are not available regarding the incidence of obesity in Canada but cursory inspection of the population indicates that excess nutrition may be more frequent than nutritional deficiencies. It seems wise to call the attention of public health officials to this problem and to urge that efforts be made to prevent a condition of excess nutrition.

Interest in the vitamins has obscured also a public health nutrition problem which is a matter of concern in Canada, the occurrence of endemic goitre. Fifteen years ago it was well established that endemic goitre could be wiped out, without harmful effects, by the universal use of iodized salt. Simple goitre still occurs in many districts in Canada and educational efforts to encourage the use of iodized salt seem to have been forgotten. Fairly early in the war iodized salt was made compulsory in all military establishments in Canada but there appear to be no plans for increasing its use by civilians. Recent data indicate that three-fifths of the families in Ontario do not purchase iodized salt. There have been no recent estimates of the incidence of goitre in Ontario but opinions indicate that goitre is still too common. A recent survey in an Ontario city showed that one-fourth of the adolescent girls exhibited thyroid enlargement. This condition should not be regarded as normal in teen-age girls but rather an indication that there is an iodine deficiency. It should be possible to ascertain the incidence of goitre and to take measures to prevent it.

The lesson that arises from consideration of obesity and of goitre is that there are nutritional problems in Canada other than the possible occurrence of sub-clinical vitamin deficiencies. Public health officials would be glad to see every Canadian receive a food supply which is optimal for health; this does not mean an excess intake of calories nor a lack of iodine. Nor does an optimal diet mean an undue emphasis upon vitamins with a consequent failure to receive adequate supplies of other equally important nutrients. The cause of nutrition will be served best by a balanced consideration of nutritional needs.

DIPHTHERIA IN HALIFAX, 1941-1943

THE analysis of diphtheria in Halifax, 1941-1943, by Dr. R. J. Gibbons with the co-operation and assistance of Dr. A. R. Morton, Commissioner of Health for Halifax, Dr. D. J. Mackenzie, Director of Laboratories for the Province of Nova Scotia, and Miss K. Dickson, Superintendent of Nurses, Halifax, is a most timely contribution.[1] It is timely, firstly, in that it shows clearly and conclusively that reliable appraisal of the value of toxoid in preventing diphtheria requires competent comparison of the incidence rates of diphtheria in two similar groups under the same exposure, but to one of which toxoid had been given; secondly, that when so appraised in the Halifax experience, toxoid was found to be highly efficacious in preventing diphtheria; and thirdly, that fully to control diphtheria, toxoid has to be used to the widest possible extent in childhood, recall doses must be given, and, in very unfavourable circumstances, such as obtained in Halifax, it may be necessary not only to extend its use to selected adult groups (difficult though this is), but also to increase the number of doses given to children.

In recent years there have appeared a few reports showing a high proportion of cases of diphtheria as having had toxoid previously; from these it might be inferred casually that diphtheria toxoid was less efficacious than reported in earlier experience. In the Halifax report there is no such implication. In fact, in this thorough and logical analysis, any doubt regarding the established efficiency of diphtheria toxoid is dissipated. It is well, however, to be so reminded of the limitations of toxoid as well as of its value.

[1]Gibbons, R. J.: Diphtheria among Schick-Negative Persons in Halifax, Nova Scotia. This issue, page 341.

Vital Statistics

Summary Report of the First Meeting of the Vital Statistics Council of Canada

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REALIZING the problems faced by the administrative officials of both the Dominion and the Provincial Governments in connection with pending social security measures, and particularly with the passing of the Family Allowance Act, the Dominion Bureau of Statistics prepared a report entitled "Implications of Social Security Measures for Vital Statistics" which was presented at a Conference of the Dominion Council of Health, representatives of the Provincial Vital Statistics offices, and officials of the Government of Canada, held at Ottawa, September 28, 1944. At this conference an agreement was reached authorizing the creation of a "Vital Statistics Council of Canada". The object of the Council was to foster and further ways and means for "coordinating and improving the efficiency of the national system of Vital Records and Vital Statistics in relation to prospective social security measures and for other purposes".

The "Vital Statistics Council of Canada" was formally constituted by the Honourable Jas. A. MacKinnon, Minister of Trade and Commerce, and the first meeting was held in Ottawa, May 31 and June 1, 1945, under the Chairmanship of Dr. S. A. Cudmore, Dominion Statistician.

Dr. Cudmore, in his opening remarks, welcomed the Provincial members and visitors present from the other Government departments, and when introducing Dr. Halbert L. Dunn, Chief Statistician for Vital Statistics in the United States Bureau of the Census, he spoke of him as "an old friend whose wise counsel and advice we greatly value . . . and we shall welcome his participation at this time in our discussions. The same social security problems that are to the fore in Canada today are also of great and immediate interest to the United States."

At the outset Dr. Cudmore read the document setting up the Council:

"For the purpose of carrying out and giving effect to the provisions of the Statistics Act of the Dominion, in connection with securing uniform methods of collecting, compiling and publishing the vital statistics of Canada and the provinces, and other matters related thereto, under an agreement between the provinces and the Dominion, agreed to at a conference between officers of the Dominion Bureau of Statistics and the Dominion Treasury, the Dominion Council of Health and representatives of the provincial vital statistics offices, held in Ottawa on September 28, 1944, the Minister of Trade and Commerce, pursuant to section 9 of the said Act, does hereby constitute a Vital Statistics Council for Canada under the following terms:

"1. That there shall be established a Vital Statistics Council for Canada comprising one representative for each province (the officer actively in charge of the provincial vital statistics office), one representative for Yukon and the Northwest Territories (to be designated by the Minister of Mines and Resources) and the Chief of Vital Statistics in the Dominion Bureau of Statistics.

"2. That the Chairman of the Council shall be the Dominion Statistician and the Vice-Chairman shall be elected annually from the representatives of the provinces, and Yukon and the Northwest Territories.

"3. That the secretary shall be a member of the Council and shall be appointed for a term to be determined by the Council.

"4. That the Vital Statistics Council shall meet at least once a year for the purpose

of discussing and advising on problems arising out of the administration of the vital records system and relative statistics.

"5. That the expenses of the Vital Statistics Council shall be borne jointly by the Dominion and the provinces on the following basis:

"'(*a*) By the Dominion, transportation expenses of all Council members to and from the place of meeting and other expenses incidental to the meeting; and

"'(*b*) By the provinces, the living expenses of the respective provincial council members while at the place of meeting.'"

Dr. C. W. MacMillan, Registrar General, Department of Health, New Brunswick, was elected Vice-Chairman and Mr. J. T. Marshall, Chief, Vital Statistics Branch, Dominion Bureau of Statistics, Secretary.

Dr. Dunn expressed his gratitude for the opportunity afforded him to be present at the first meeting of the Canadian Council and said in part:

"Throughout the last decade or two of my life I have wished to see emerge in my own country something of the order that is emerging here. It is a wonderful step forward because it means this subject which is in your hands and under your jurisdiction is going to become with the passage of time the very centre of many of the activities of government because they all have to tie into who people are, how the family structure is made up, and where they are located. Those are the facts that are being tied into the statistical picture of the country, and as it is coming here I think it is epoch-making. I only hope we can follow in your footsteps."

Dr. C. W. MacMillan was elected the first Chairman of the Committee on Rules and Regulations of the Council. Mr. J. D. B. Scott of British Columbia was chosen Chairman of the Resolutions Committee and Miss L. E. Stewart of Manitoba, Chairman of the Committee on Agenda for meetings; two colleagues from the members of the Council to be chosen by each Chairman.

The Secretary explained in detail the aspects of a draft Order in Council which confirms the several agreements between the provinces and the Dominion, and read it clause by clause for the convenience of the delegates. After a general discussion the provincial officials signified their unanimous approval of the Order as drafted. Mr. Marshall assured the members that immediate steps would be taken to have the Order in Council ratified and copies would be supplied to each province.

Business arising out of resolutions passed at the last Vital Statistics Conference was considered. Mr. Marshall advised the Council that the Manual for the Classification of Stillbirths was in the process of printing; the Handbook on Certification of Causes of Death was being considered by the Committee of the C.H.P.A., under the chairmanship of W/C Sellers, and the reprint of the Vital Statistics material appearing in the Canada Year Book of 1945 would be released shortly for distribution. He remarked that the Dominion Council of Health at their meeting recommended that the "Vital Statistics of Canada" be extended to include more communicable disease statistics, and requested that the provincial officials transmit any suggestions concerning additional material which they considered might be embodied in the report.

The Geographical Code was reported as being in process of revision and the provincial officers were thanked for additional information which had been provided to the Bureau in this connection.

Dr. Cudmore reported that he had taken cognizance of the resolution requesting the consideration of the possibility of making available the records of the

nearest Census following the birth of an applicant desiring evidence necessary to procure a delayed registration. He explained that two factors had prevented any definite action being taken; namely, priorities on machines and lack of staff. Also he advised the members that he had discussed the matter very thoroughly with Dr. O. A. Lemieux, Chief of the Census Branch, and after careful deliberation he had decided it was not expedient, at the present at least, to open Census records of less than thirty years ago. He suggested, however, that they leave the matter in his hands for further consideration, as he realized it was a subject of great importance, especially to elderly people.

Dr. Dunn brought forward the question of "Small Area" statistics, stressing the significance of being able to coordinate social and administrative statistics of particular areas with other statistics; having available a common basis for rates, calculations and estimates. Dr. Lemieux advised the members that considerable work had been done already in Canada in this connection. Vancouver and Winnipeg had been divided into "Census tracts" before the 1941 Census and the Bureau was hopeful that before the 1946 Census was taken Edmonton, Calgary, Regina and Saskatoon would be divided similarly. He also stated the Bureau was desirous that, before the 1951 Census, all places with a population of 50,000 and over would be divided into Census tracts for which "we will, probably in bulletin form, publish what we commonly call the 'counting of noses' and then any other special classification that might be wanted could be made available to the various organizations." He remarked that many requests were received for such information.

At the opening of the afternoon session Dr. Cudmore welcomed Major General Chisholm, Deputy Minister of Health, and Dr. G. F. Davidson, Deputy Minister of Welfare, who were present to take part in the discussions concerning the proposed National Register and Index of Vital Statistics.

Mr. C. Scott, recently appointed to the Vital Statistics staff of the Dominion Bureau of Statistics, introduced the subject by presenting a paper entitled "The Mechanization of Vital Statistics Registrations".

The treatise clearly outlined the steps necessary for the transition from the present system of the use of statistical transcripts to the suggested microfilm system of reproduction. The broad objectives were stated to be:

"(*a*) The linking of Vital Records of Births, Stillbirths, Legitimation, Change of Name, Adoption, Marriage Dissolution, Immigration, Emigration and Death.

(*b*) A system of numerical identification of the individual and of the family based on registrations of Vital Records which would be acceptable to and used in preference to other systems by peacetime and military agencies."

It was pointed out that the general implementation of this system would:

"(*a*) Strengthen and improve Provincial vital registrations;

(*b*) Administratively serve peacetime and military agencies, and

(*c*) Further the statistical study of human life",

and that the mechanics of the system required, in order to accomplish this desired end, would consist of a microfilm record of all provincial registrations and the use of punch cards and Hollerith electrical tabulating equipment. By the use of charts, details in connection with the system, such as the numerical identification to be used for the individual and family identification and the best method of

numbering and filing registrations, were minutely explained. The uniform index sheet proposed for the National Index was also described and a summary of suggested tabulations for each province was outlined.

A lengthy discussion of the proposals followed in which all present participated.

Mr. H. G. Page, of the Vital Statistics staff, presented a report entitled "Outline of Procedure for Photographing Vital Registrations on Microfilm after July 1st, 1945." Mr. Page had been entrusted with the task of installing the microfilm system in the Provincial offices of the Maritime provinces in December, 1944, and January, 1945, and, therefore, could speak on the subject with a knowledge ripened by experience. His clear and concise explanation of the photographic procedure necessary in connection with the new system was intently followed by the gathering.

Mr. Page stated in part:

"The microfilming procedure and the work of preparing the National Index and statistical tabulations in the Bureau are more or less inseparable. Suggestions which have been put forward, or general principles which have been enunciated—particularly with reference to filing procedures, the numbering of volumes, the numbering of registrations, etc.—have been made in the light of requirements of both of these basic procedures. In other words our main objective has been to provide the provinces with as accurate and simple a microfilm record as possible to which reference can be made at any time with the minimum of effort, and at the same time a record which will facilitate and expedite the mechanical work in the Bureau in connection with the preparation of the index and the compilation of vital statistics data. In some respects the basic filing procedures suggested have been made in the light of microfilming requirements, but in most respects the microfilm procedure has had to be adapted to fit the general plan.

"In so far as microfilming is concerned, registrations may be divided into three main groups: current registrations, late registrations and registrations which have been amended or corrected since originally microfilmed."

Explaining these three main groups, Mr. Page stated:

"Current Registrations:

"Current registrations will consist of all registrations for the current year of event. If the transmission of registrations to the provincial office is adopted on a weekly basis, this will permit the photographing of registrations for transmission to the Bureau on the same basis.

"Registrations on receipt should be carefully checked for missing information, and registrations which are found incomplete should be immediately returned to their source for completion. The importance of the checking of registrations and their completion before microfilming cannot be too strongly stressed in the light of the amount of effort involved in correcting and rephotographing such registrations at a later date. Registrations which have not been returned in time to be included with the current week can be included in the shipment for the subsequent or succeeding weeks.

"Registrations which are complete can then be numbered immediately in sequence from the last registration number of the previous week, microfilmed and immediately filed in their appropriate volume.

"The actual procedure for photographing the registrations is laid out in the Instructions for Microfilming Vital Records, with which most provinces have been provided.

"Late Registrations:

"For purposes of terminology we might designate late registrations as all those received in the provincial office later than a designated date after the end of each year of event.

(The period after the end of each year after which a registration is to be designated as a late registration would, of course, have to be determined by the Council.)

"Such 'late' registrations should be photographed on the film immediately following 'current' registrations. They should, of course, be properly identified as to year of event, the volume number in which the registrations are to be eventually filed, and the roll number of the film to which they will be spliced.

"Amended or Corrected Registrations:

"In the normal course of provincial administration there are amendments, or corrections of original registrations—changes of name, legitimations, adoptions, etc.—changes which are either inserted directly on the original Registration or appended in the form of marginal notes. Registrations which have thus been subjected to any change since originally microfilmed must be rephotographed, immediately following the group of late registrations on the film. The importance of rephotographing all registrations which have been amended in any way is apparent, particularly if the microfilm is to be referred to currently in the provincial office either for transcribing certificates or for the reproduction of photostat copies directly from the negative film."

The splicing process which will be necessary to take care of additional or corrected information received, as well as for delayed registrations, was explained in detail.

Copies of a tabulation setting forth an estimate of the number of images which can be easily photographed on a 100-foot roll of 35 mm. microfilm for present registration forms in each province were presented to the members for their information.

The provinces consented to number all their registrations on a uniform basis as recommended by the Dominion Bureau of Statistics and also to study the advisability of the adoption of a weekly return to the Dominion Bureau of Statistics, rather than monthly as at present.

The immediate need of a National Index in connection with family allowances for deaths which have taken place since January 1945, was explained by Dr. Davidson, who said in part:

"I want to point out how particularly important it is that a record of all the deaths occurring during the first six months of this year should be sent to us if at all possible in time to prevent us from unwittingly making payments to parents who quite properly made application in February, March or April in respect to children who have since died. We want to avoid that embarrassing situation if we can, and we can if it is possible to devise some way of getting these deaths reported to us quickly."

The members agreed to give this matter their immediate attention and it was decided also that the National Index of Vital Records should include deaths of all persons dying since January 1, 1925, to date, similar to that regarding births.

Dr. Dunn brought to the attention of the Council the introduction of an identification birth card system which was proving most popular in the United

States. The primary purpose of the card is for ready reference where identification is required.

Dr. Dunn explained it as a convenient pocket-sized card which bears the full name, sex, colour, place and date of birth, date the original birth record was filed, certificate number, and the certificate over the signature of the authorizing official, with the official Seal affixed. In cases of legitimation or adoption a revised birth card should be issued bearing the child's new name.

It was pointed out that if it became necessary for the birth registration number of a child to appear on a Family Allowance application it would immediately create the need for having proof of that number in some convenient form.

After general discussion the members agreed that the use of such an identification card would be of extraordinary value and service to the public and to governmental agencies, and would prove invaluable in the posting and linking of records. It was, therefore, resolved that the members of the Council should recommend to their respective Provincial Governments the advisability of adopting a card system similar to that outlined in the report entitled "Plan for the Coordination of Vital Records and Vital Statistics in the United States". The Dominion Bureau of Statistics was requested to survey the situation and report to the provinces with a view to securing a uniform system of procedure.

Mr. Curry, National Director of Family Allowances, enquired if the mass of material which had been collected in connection with Family Allowances (at present over a million registration forms), would be useful as source material for statistical purposes. Their office was breaking it down in terms of money, but could it not be used in terms of human beings?

Dr. Davidson suggested that after the scheme of Family Allowances was running smoothly there should be set up some sort of statistical or reporting system in each regional office. The Department of National Health and Welfare should consult the Bureau and work out a scheme whereby the raw material could be supplied to the Bureau for analysis and compilation and the results made available for the use of those who might desire to use the statistics. Dr. Davidson said in part:

"It is going to be a gold mine of information. For one thing, I can see the possibility of its providing an accurate means of checking against the Bureau's estimates as to family composition, distribution of children within age groups, and a large variety of subjects. For example, we can now tell how close to the fact was the Bureau's original estimate of the family units in Prince Edward Island with children under sixteen. As Doctor Dunn has mentioned, in the light of this large and consistent sample of the population we can estimate the transfers between provinces. The material also contains a good deal of information as to school attendance, children's physical defects of one kind and another, and much other information which would no doubt be useful if we could devise some means of extracting it."

Dr. Cudmore said the Bureau would be pleased to give the matter consideration.

Dr. Moore, Acting Superintendent, Medical Services, Indian Affairs Branch, reported that the new system of reporting events concerning Indians (Wards of the Government) on special registration forms was progressing satisfactorily. Some questions had arisen and had been dealt with, such as

the matter of delayed registrations of birth. After his office had been informed of a slackening off of registrations in the Northwest Territories, the agents had been re-circularized, by personal letters, in which was stressed the necessity of getting accurate records up to date and keeping them that way.

Concerning the administration of Family Allowances for the Indians, Dr. Moore stated:

"Under our system the Indian agent reviews the eligible families and notifies us which Indians he considers have sufficient intelligence to handle their own money. All such Indians receive their family allowances in the same way as anyone else in the country. But with respect to any Indian who is not considered to be in this class we do one of two things: either we send the cheque in care of the agent, who tries to supervise the spending of the money, or we establish credit for the Indian at the trading post or store and prescribe what he may and may not purchase with the money. I may add that under the latter plan we try to see to it that he is restricted to purchasing chiefly things of benefit to his children—milk and milk products, pabulum, fruit juices and other specially nutritive foods, clothing and so on."

Dr. P. E. Moore assured the members of the Council that it was the wish of the Branch that all provincial regulations be complied with.

Dr. MacMillan, Chairman of the Committee on Rules and Regulations of the Council, submitted the following report which was unanimously adopted:

"1. This organization shall be known as the Vital Statistics Council for Canada.

"2. The Council shall meet at least once during each calendar year, and all meetings shall be at the call of the Chairman, provided that upon request of a majority of the members of the Council the Chairman shall call a special meeting of the Council. Between Council meetings the Secretary shall submit to the members of the Council in writing any matters requiring consideration and approval. Such matters shall be decided upon by majority opinion.

"3. A quorum shall consist of eight members of the Council.

"4. Each member of the Council, including the officers, shall have the privilege of voting.

"5. In the event that any provincial or Dominion member of the Council is unable to attend any meeting for any reason, he may designate a substitute by notifying the Chairman in writing and such substitute shall have full voting powers.

"6. The Secretary shall be elected annually from the membership of the Council, provided that should the Secretary cease to be a member of the Council, for any reason, the Chairman shall appoint a person to act as Secretary until the next meeting of the Council.

"7. The rules and regulations of the Council may be amended upon notice of motion given at a previous meeting of the Council and shall become effective by a two-thirds vote of Council."

A recommendation of the committee was that the Chief of the Census Branch of the Bureau of Statistics be a member of the Council, and that before the Order in Council creating the Council was ratified it be amended to provide for this.

While the committee did not deal specifically with the place of meeting, it suggested that the Council might meet not only in the Dominion capital but in provincial capitals from time to time. It was felt that this could be decided at a later meeting.

The experience and the problems encountered by the provinces in connection with the National Register are to be pooled, under the guidance of the Dominion Bureau of Statistics, for the benefit of all.

The members recorded their appreciation to those through whose efforts the first meeting of the Council proved so successful and it is with confidence that all look forward to the future development of vital statistics in Canada through this medium.

News

British Columbia

THROUGH the Division of Venereal Disease Control of the Provincial Board of Health, penicillin has been made available free of charge to private physicians for the treatment of suspected or proven gonorrhoea—recommending treatment on an ambulant basis. Arrangements have also been made for the free distribution of penicillin in certain selected cases of communicable syphilis, such as patients in remote rural areas inaccessible to treatment, asocial promiscuous people, etc. Treatment of syphilis by penicillin is regarded at present as a hospital procedure only.

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AS A RESULT of the deaths that occurred in 1942 from the eating of toxic shellfish in British Columbia, a considerable amount of work has been done by both the Federal and Provincial Departments of Fisheries, the Department of National Health and Welfare, and the Provincial Board of Health. In June 1945 a committee composed of officials of the above agencies, was formed to correlate the information that has been gathered and to recommend future action with regard to shellfish control on the West Coast. Dr. G. F. Amyot, Provincial Health Officer, is chairman of the committee.

Since this committee was formed, the Public Health Engineering Divisions of the Department of National Health and Welfare and of the Provincial Board of Health have carried on a joint sanitary survey of Ladysmith Harbour, one of the principal oyster-producing areas of British Columbia.

* * *

TWO MOBILE UNITS are in operation throughout the province carrying out mass X-ray surveys in various areas. The spring and summer months have been spent in rural areas and it has been planned to have a concentrated survey in the Vancouver District beginning November 15th. At that time the two mobile units and the Vancouver Stationary Clinic will operate together in an attempt to X-ray as many of the Vancouver citizens as possible. The Division of Tuberculosis Control is supplying the equipment and technical personnel to the local areas, which have the final responsibility for seeing that the surveys are carried through.

A new temporary addition of seventy beds has been opened in the Vancouver Unit, Division of Tuberculosis Control.

Plans are under way for a new 300-bed tuberculosis sanatorium. It is hoped that this will be the first unit of an institution which eventually will contain 500 beds. The new institution will be situated in Vancouver and it is hoped to start construction early in 1946.

A new chest clinic has been opened in New Westminster. This clinic was built by the New Westminster Gyro Club and houses the clinic of the Division of Tuberculosis Control and the Red Cross centre for New Westminster. The equipment for the Division's clinic was provided by the British Columbia Tuberculosis Society through the sale of Christmas seals.

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MRS. ERNESTINE TRENHOLM, a graduate in home economics from Mount Allison University, started her duties as Junior Nutritionist with the Provincial Board of Health on August 1st. She is the second nutritionist to be employed by the Board of Health.

Alberta

UNDER the recent Amendment to the Solemnization of Marriage Act, no issuer of marriage licences in the Province may issue a marriage licence, nor may any minister of clergyman publish the bans of a marriage, unless there has been filed with the issuer of marriage licences or with the minister or clergyman a certificate from a duly qualified physician registered in and for the Province of Alberta, certifying for both parties to the intended marriage that:

"A specimen of blood for the serologic test for syphilis has been taken from..... of..... on the.....day of .....19..... and has been sent, or will be sent, to the Provincial Laboratory approved by the Director of the Provincial Laboratory. The result of the test will be conveyed by me to the aforesaid....."

The medical practitioner will be entitled to receive from the person whose serologic test is taken a sum not exceeding $2.00. It will be noted that the physician is not required to give an opinion, but merely to take the specimen of blood, submit it to the Laboratory, and convey the result of the test

of the person concerned. The Director of the Laboratory is required to report all positive tests to the Director of the Division of Social Hygiene, who may then, in co-operation with the patient's own physician, take whatever steps are necessary to determine the significance of the positive serologic test.

It is not intended that the marriage should be interfered with in any way. Often the results of the test will not be available until after the marriage has taken place. The amendment simply makes necessary the blood testing of the 16,000 persons who enter the marriage state in Alberta every year and is for the sole purpose of detecting unsuspected syphilis. The report on the result of a test is not filed with the issuer of marriage licences, nor is any other person informed of the result.

Manitoba

PREPARATIONS are under way for the annual meeting of the Manitoba Health Officers Association, which will be held on September 24th.

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FULL-TIME rural health units are being organized in the Portage la Prairie, Swan River, and Ste. Anne areas. These units will commence operation as soon as sufficient personnel becomes available.

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DR. BENJAMIN G. HORNING, Field Director of the W. K. Kellogg Foundation, Battle Creek, Michigan, spent several days in Winnipeg during the last week in August interviewing officials of the Department of Health and Public Welfare and the Dean of the Manitoba Medical College regarding plans for the training of public health personnel. Dr. Horning's particular concern is with the extension and improvement of facilities for the post-graduate training of nurses and physicians entering the public health field.

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THE CANADIAN RED CROSS SOCIETY scholarship of $600 has been awarded to Miss Jean Heighton of St. Vital, Manitoba. This is the first scholarship offered by the Manitoba Division of the Red Cross for post-graduate study in public health nursing. Miss Heighton, who graduated from the Winnipeg General Hospital School of Nursing in 1943, will commence her post-graduate work at the School of Nursing Education, University of Manitoba, in September. Upon the completion of her course, Miss Heighton will serve as a public health nurse in rural Manitoba for at least two years, as a member of the nursing staff of the Department of Health and Public Welfare.

Ontario

TWENTY-THREE PHYSICIANS who were enrolled in the course leading to the Diploma in Public Health at the School of Hygiene, University of Toronto, during the academic session 1944-45, have completed the requirements and have been granted the Diploma. They are: C. A. Beaudet, Three Rivers, Que.; D. C. Bews, Kingston, Ont.; N. Blais, Weedon, Que.; R. F. Brown, Toronto, Ont.; G. Charest, Montreal, Que.; J. B. Cook, Sudbury, Ont.; A. J. Denne, Toronto, Ont.; H. S. Doyle, Toronto, Ont.; R. A. Kennedy, Sarnia, Ont.; A. Laperriere, Nicolet, Que.; H. J. Leeson, Toronto, Ont.; N. D. C. MacKinnon, Calgary, Alta.; D. S. McCurdy, Sydney, N.S.; J. M. McGarry, Toronto, Ont.; J. L. Milot, St. Eustache, Que.; L. P. Peloquin, Cookshire, Que.; J. W. Rogers, Port Sandfield, Ont.; F. Stephenson, Jamaica, B.W.I.; L. W. C. Sturgeon, Meaford, Ont.; M. I. Templin, Hamilton, Ont.; E. A. Watkinson, Ottawa, Ont.; J. F. Webb, Saint John; and F. H. Wilson, Stouffville, Ont.

The Diploma in Industrial Hygiene was granted to Dr. J. J. Collins of Ituna, Sask., and the Diploma in Dental Public Health to S. L. Honey, D.D.S., Toronto, and to F. A. Kohli, D.D.S., Orillia, Ont.

A group of six graduates in veterinary science qualified for the Diploma in Veterinary Public Health: E. C. Chamberlayne, New Westminster, B.C.; R. F. Colgate, Weston, Ont.; G. A. Edge, Toronto, Ont.; N. A. Fish, Oakville, Ont.; J. C. C. Gandier, Ont.; and J. A. Murray, Gravenhurst, Ont.

The Certificate in Public Health was awarded to Miss F. B. Swan, of Oxford, N.S.